

What is claimed is:

*Sub A17*

1. A sheet feeder for separating sheet materials stacked on a pivotable sheet material stacking member one by one from the topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

a sheet feed roller configured to come in pressing contact with the topmost sheet material for feeding the sheet material to a separator; and

10 a tilt member configured to come in pressing contact with said sheet feed roller and including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact face in contact with said sheet feed roller in the shape of an edge along an axial direction of said sheet feed roller.

2. A sheet feeder according to claim 1, wherein said tilt member is in pressing contact with said sheet feed roller for pivotal movement with respect to said sheet feed roller.

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3. A sheet feeder according to claim 1, wherein said tilt member includes translating means for advancing and retracting said tilt member in parallel to an axis of said sheet feed roller.

4. A sheet feeder according to claim 3, wherein said translating means includes a rib formed on one of said tilt member and a feeder body, and a guide rail formed on the other.

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5. A sheet feeder according to claim 1, wherein said tilt member's contact face has a length which is less than an axial length of said sheet feed roller.

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6. A sheet feeder according to claim 1, wherein said tilt member is formed of a synthetic resin, and includes a metal plate for covering at least the contact face with said sheet feed roller.

*Sub A* 15 7. A sheet feeder according to claim 6, wherein said metal plate is elastic.

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8. A sheet feeder according to claim 7, wherein said elastic metal plate is mounted from the tilt face so as to surround said tilt member on both upper and lower sides.

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*Sub C* 16 9. A sheet feeder according to claim 1, wherein the distance in a sheet material convey direction between a location of said sheet feed roller at which said tilt member is in pressing contact with said sheet feed roller and a

location of said sheet feed roller at which a sheet stacked  
on said sheet material stacking member comes in contact with  
said sheet feed roller is in a range of 2 mm to 6 mm, and  
the angle of the tilt face of said tilt member to the sheet  
5 material convey direction is in a range of 50° to 70°.

10. A sheet feeder according to claim 1, further  
comprising a thin elastic member disposed at a location  
downstream of a contact area of said sheet feed roller in  
10 contact with said tilt member such that said thin elastic  
member crosses a tangential direction of said contact area.

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11. A sheet feeder according to claim 10, wherein said  
thin elastic member comprises two members disposed at both  
15 sides of said sheet feed roller.

12. A sheet feeder according to claim 10, wherein said  
thin elastic member is disposed substantially at a center of  
said sheet feed roller.

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13. A sheet feeder according to claim 1, further  
comprising a thin elastic member crossing a tangential  
direction of the contact area at a location downstream of  
the contact area of said sheet feed roller with said tilt  
25 member, said thin elastic member including a bent in the

shape of hook bent toward said sheet feed roller at a rear end.

14. A sheet feeder according to claim 13, wherein said  
5 thin elastic member comprises two members disposed on both  
sides of said sheet feed roller.

15. A sheet feeder according to claim 13, wherein said  
thin elastic member is disposed substantially at the center  
10 of said sheet feed roller.

16. A sheet feeder according to claim 13, wherein said  
thin elastic member crosses the tangential direction at an  
angle ranging from 20° to 60°.

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17. A sheet feeder according to claim 1, further  
comprising a friction member crossing a tangential direction  
to a contact area of said sheet feed roller in contact with  
said tilt member at a location downstream of the contact  
20 area.

*Sub A6*      18. A sheet feeder according to claim 17, wherein said  
*B2* friction member comprises two members disposed at both sides  
of said sheet feed roller.

19. A sheet feeder according to claim 17, wherein said friction member is disposed substantially at a center of said sheet feed roller.

5       20. A sheet feeder according to claim 1, further comprising:

a pressure lever having a free end configured to come in contact with and move away from said sheet material stacking member;

10       a sensing lever mounted coaxially with said pressure lever for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

an elastic member disposed between said sensing lever and said pressure lever.

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21. A sheet feeder according to claim 20, wherein said pressure lever is pivotally moved in association with said sensing lever when an angle of said pressure lever to said sensing lever is greater than a predetermined angle.

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22. A sheet feeder according to claim 20, wherein said sensing lever includes a pair of arms at a free end thereof, said arms extending from both sides of said tilt member, wherein said sensing lever pivotally moves to cause said arms to pass both sides of the contact area of said tilt

member.

23. A sheet feeder according to claim 20, wherein said sensing lever includes spring pressure changing means for 5 adjusting an urging force of a compression spring for pressing said tilt member onto said sheet feed roller.

24. A sheet feeder according to claim 23, further comprising a spring bearer disposed slidably in an axial 10 direction of said compression spring on an opposite side of said compression spring with respect to said tilt member, wherein said spring pressure changing means engages with and disengages from said spring bearer associated with pivotal movement of said sensing lever, and said spring pressure 15 changing means drives said spring bearer toward said tilt member when said spring pressure changing means engages with said spring bearer.

25. A sheet feeder according to claim 1, further 20 comprising first cams disposed coaxially with said sheet feed roller for separating said sheet material stacking member from said sheet feed roller when said first cams come in contact with both side ends of a front face of said sheet material stacking member.

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26. A sheet feeder according to claim 25, wherein said sheet material stacking member includes pressor ribs at both side ends at a front face thereof, such that said first cams come in contact with said pressor ribs.

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27. A sheet feeder according to claim 25, further comprising second cams disposed coaxial with said sheet feed roller for separating said tilt member from said sheet feed roller when said second cams come in contact with both side 10 ends of said tilt member.

28. A sheet feeder according to claim 27, wherein said tilt member includes ribs at both side ends such that said second cams come in contact with said ribs.

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b* 29. A sheet feeder according to claim 27, further comprising a tilt member holder plate between said second cams and said tilt member, said tilt member holder plate being formed with an opening for avoiding a site at which 20 said sheet feed roller comes in contact with said tilt member, said tilt member holder plate having a leading end spaced apart from said sheet material stacking member.

30. A sheet feeder for separating sheet materials 25 stacked on a pivotable sheet material stacking member one by

one from the topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with the topmost sheet material for feeding the sheet  
5 material to a separator; and

tilt member means for coming in press contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a contact face 10 in contact with said sheet feed roller means in the shape of an edge along an axial direction of said sheet feed roller means.

31. A sheet feeder according to claim 30, wherein said  
15 tilt member means is in pressing contact with said sheet feed roller means for pivotal movement with respect to said sheet feed roller means.

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*30* 32. A sheet feeder according to claim 30, wherein said tilt member means includes translating means for advancing and retracting said tilt member means in parallel to an axis of said sheet feed roller means.

33. A sheet feeder according to claim 32, wherein said  
25 translating means includes a rib formed on one of said tilt

member means and a feeder body, and a guide rail formed on the other.

34. A sheet feeder according to claim 30, wherein said  
5 contact face of said tilt member has a length that is less than an axial length of said sheet feed roller means.

35. A sheet feeder according to claim 30, wherein said  
tilt member means is formed of a synthetic resin, and  
10 includes a metal plate for covering at least the contact face with said sheet feed roller means.

36. A sheet feeder according to claim 35, wherein said  
metal plate is elastic.

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37. A sheet feeder according to claim 36, wherein said  
elastic metal plate is mounted from the tilt face so as to surround said tilt member means on both upper and lower sides.

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38. A sheet feeder according to claim 30, wherein the distance in a sheet material convey direction between a location of said sheet feed roller means at which said tilt member means is in pressing contact with said sheet feed roller means and a location of said sheet feed roller means

at which a sheet stacked on said sheet material stacking member comes in contact with said sheet feed roller means is in a range of 2 mm to 6 mm, and the angle of the tilt face of said tilt member means to the sheet material convey 5 direction is in a range of 50° to 70°.

39. A sheet feeder according to claim 30, further comprising thin elastic member means disposed at a location downstream of a contact area of said sheet feed roller means 10 in contact with said tilt member means such that said thin elastic member crosses a tangential direction of said contact area.

*Sus AM* 40. A sheet feeder according to claim 39, wherein said thin elastic member means comprises two members disposed at both sides of said sheet feed roller means.

41. A sheet feeder according to claim 39, wherein said thin elastic member means is disposed substantially at a 20 center of said sheet feed roller means.

42. A sheet feeder according to claim 30, further comprising thin elastic member means crossing a tangential direction of the contact area at a location downstream of 25 the contact area of said sheet feed roller means with said

tilt member means, said thin elastic member means including a bent in the shape of hook bent toward said sheet feed roller means at a rear end.

5        43. A sheet feeder according to claim 42, wherein said thin elastic member means comprises two members disposed on both sides of said sheet feed roller means.

10      44. A sheet feeder according to claim 42, wherein said thin elastic member means is disposed substantially at the center of said sheet feed roller means.

15      45. A sheet feeder according to claim 42, wherein said thin elastic member means crosses the tangential direction at an angle ranging from 20° to 60°.

20      46. A sheet feeder according to claim 30, further comprising friction member means crossing a tangential direction to a contact area of said sheet feed roller means in contact with said tilt member means at a location downstream of the contact area.

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③ 25      47. A sheet feeder according to claim 46, wherein said friction member means comprises two members disposed at both sides of said sheet feed roller means.

48. A sheet feeder according to claim 46, wherein said friction member means is disposed substantially at a center of said sheet feed roller means.

5       49. A sheet feeder according to claim 30, further comprising:

pressure lever means having a free end configured to come in contact with and move away from said sheet material stacking member;

10       sensing lever means mounted coaxially with said pressure lever means for pivotal movement associated with insertion/removal of a cassette having said sheet stacking member; and

15       elastic member means disposed between said sensing lever means and said pressure lever means.

50. A sheet feeder according to claim 49, wherein said pressure lever means is pivotally moved in association with said sensing lever means when an angle of said pressure lever means to said sensing lever means is greater than a predetermined angle.

*Sub A13)*       51. A sheet feeder according to claim 49, wherein said sensing lever means includes a pair of arms at a free end thereof, said arms extending from both sides of said tilt

member means, wherein said sensing lever means pivotally moves to cause said arms to pass both sides of the contact area of said tilt member means.

5        52. A sheet feeder according to claim 49, wherein said sensing lever means includes spring pressure changing means for adjusting an urging force of a compression spring for pressing said tilt member means onto said sheet feed roller means.

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10        53. A sheet feeder according to claim 52, further comprising spring bearing means disposed slidably in an axial direction of said compression spring on an opposite side of said compression spring with respect to said tilt member means, wherein said spring pressure changing means engages with and disengages from said spring bearing means associated with pivotal movement of said sensing lever means, and said spring pressure changing means drives said spring bearing means toward said tilt member means when said spring pressure changing means engages with said spring bearing means.

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25        54. A sheet feeder according to claim 30, further comprising first cam means disposed coaxially with said sheet feed roller means for separating said sheet material

stacking member from said sheet feed roller means when said first cam means come in contact with both side ends of a front face of said sheet material stacking member.

5        55. A sheet feeder according to claim 54, wherein said sheet material stacking member includes pressor rib means on both side ends at a front face thereof, such that said first cam means come in contact with said pressor rib means.

10        56. A sheet feeder according to claim 54, further comprising second cam means disposed coaxial with said sheet feed roller means for separating said tilt member means from said sheet feed roller means when said second cam means come in contact with both side ends of said tilt member means.

15        57. A sheet feeder according to claim 56, wherein said tilt member means includes rib means at both side ends such that said second cam means come in contact with said rib means.

20        58. A sheet feeder according to claim 56, further comprising tilt member holder plate means between said second cam means and said tilt member means, said tilt member holder plate means being formed with an opening for  
25        avoiding a site at which said sheet feed roller means comes

in contact with said tilt member means, said tilt member holder plate means having a leading end spaced apart from said sheet material stacking member.

- 5        59. An image forming apparatus comprising:  
          a sheet feeder that separates sheet materials stacked  
          on a pivotable sheet material stacking member one by one  
          from a topmost sheet material for feeding each of said sheet  
          materials, said sheet feeder comprising:  
10        a sheet feed roller configured to come in pressing  
          contact with a topmost sheet material for feeding the sheet  
          material to a separator; and  
          a tilt member configured to come in pressing  
          contact with said sheet feed roller and including a tilt  
15        face, said sheet feed roller having a front end running  
          against said tilt face, said tilt member having a contact  
          face in contact with said sheet feed roller in the shape of  
          an edge along an axial direction of said sheet feed roller,  
          and  
20        an image forming mechanism configured to form an image  
          on the sheet material fed out from said sheet feeder.

60. An image forming apparatus comprising:  
          sheet feed means for separating sheet materials  
25        stacked on a pivotable sheet material stacking member one by

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one from a topmost sheet material for feeding each of said sheet materials, said sheet feeder comprising:

sheet feed roller means for coming in pressing contact with a topmost sheet material for feeding the sheet  
5 material to separating means; and

tilt member means for coming in pressing contact with said sheet feed roller means and including a tilt face, said sheet feed roller means having a front end running against said tilt face, said tilt member means having a  
10 contact face in contact with said sheet feed roller means in the shape of an edge along an axial direction of said sheet feed roller means, and

image forming means for forming an image on the sheet material fed out from said sheet feeding means.

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61. A method of image forming, comprising the steps of:  
causing a sheet feed roller to come in pressing contact with a topmost sheet material stacked on a pivotable sheet material stacking member so as to feed the sheet  
20 material to a separator; and

making a tilt member come in pressing contact with said sheet feed roller, said tilt member including a tilt face, said sheet feed roller having a front end running against said tilt face, said tilt member having a contact  
25 face in contact with said sheet feed roller in the shape of

an edge along an axial direction of said sheet feed roller.

62. A method of image forming, comprising the steps of:  
causing a sheet feed roller to come in pressing  
5 contact with a topmost sheet material stacked on a pivotable  
sheet material stacking member so as to feed the sheet  
material to a separator;  
making a tilt member come in pressing contact with  
said sheet feed roller, said tilt member including a tilt  
10 face, said sheet feed roller having a front end running  
against said tilt face, said tilt member having a contact  
face in contact with said sheet feed roller in the shape of  
an edge along an axial direction of said sheet feed roller;  
and  
15 forming an image on the sheet material fed out from  
said sheet feeder.
63. A sheet feeder comprising:  
a support for a stack of sheets including a topmost  
20 sheet;  
a rotationally mounted feed roller in pressing contact  
with the topmost sheet in the stack and rotating  
about an axis for frictionally feeding said  
topmost sheet in a feeding direction;  
25 a sheet separating member having at least one tilt face

at least a part of which is downstream from the support in said feed direction and further having at least one contact face urged in pressing contact with said feed roller;

5 said pressing contact being (a) edge-shaped, (b) along a line parallel to the feed roller axis, and (c) downstream from said support in said feeding direction;

10 said topmost sheet being fed in the feeding direction by said feed roller and being directed toward said edge-shaped pressing contact by said tilt face, and said edge-shaped pressing contact being operative to pass the topmost sheet between said at least one contact face and said feed roller but prevent passage therethrough of a sheet from the stack frictionally engaged with the topmost sheet 15 and moving therewith in the feeding direction.

64. A ~~sheet~~ feeding method comprising:

20 providing a stack of sheets including a topmost sheet; feeding the topmost sheet in a feeding direction using a rotating feed roller in frictional contact therewith; using a pressing contact between the feed roller and at 25 least one contact face of a separating member to

pass the topmost sheet therethrough but keep from  
passage a sheet from the stack that is in  
frictional contact with the topmost sheet and is  
moving therewith in the feeding direction;

5 said using step comprising using a pressing contact  
that is edge-shaped and extends along a line  
parallel to a rotational axis of the feed roller.